



ENERGIEKER

ENVIRONMENT PRODUCT DECLARATION



Product Name: Ceramic Tiles - ENERGIEKER

**Site Plant: PAVULLO NEL FRIGNANO GOLD ART – linea piastrelle
Via Giardini Nord n° 231/233 – 41026 Pavullo nel Frignano (MO) Italia**

in compliance with ISO 14025 and EN 15804


Program Operator:	EPDIItaly
Publisher:	EPDIItaly

Declaration Number:	GOLD_PAV_01
EPDIItaly Registration Number:	EPDITALY0150
ECO EPD Registration Number:	

Issue Date:	31/05/21
Valid to:	31/05/26



GENERAL INFORMATION

EPD HOLDER	Gold Art Ceramica S.p.a. via Giardini Nord, n° 231/233 - 41026, Pavullo nel Frignano (MO), Italia
PRODUCTION FACILITIES INCLUDED IN THE EPD	Gold Art headquarter located at Pavullo nel Frignano – ceramic tiles production line via Giardini Nord, n° 231/233 - 41026, Pavullo nel Frignano (MO), Italia
APPLICATION FIELD:	The ceramic tiles included in the scope of this site are meant for floor and wall installation both in outdoor and indoor space with either residential, non-residential and commercial purposes.
PROGRAM OPERATOR:	EPDITALY (www.epditaly.it) via Gaetano De Castillia n° 10 - 20124 Milano, Italia
INDEPENDENT AUDITING:	The following declaration has been drafted in compliance with the EPDItaly Regulation: further information and relevant Regulation may be consulted at the link: www.epditaly.it . The EN 15804 norm represents the frame of reference for the PCR (PCR ICMQ – 001/15 rev. 2.1). PCR review has been carried out by Daniele Pace – info@epditaly.it Independent auditing of the declaration and its data has been carried out in compliance with ISO 14025:2010. <input type="checkbox"/> Interna <input checked="" type="checkbox"/> Esterna Third-party auditing carried out by: ICMQ S.p.A., via Gaetano De Castillia n° 10 - 20124 Milano, Italia. Accreditato da Accredia.
COMPANY CONTACT:	Dott. Vittorio Vandelli – Gold Art Ceramica S.p.a. via Giardini Nord, n° 231-233 - 41026, Pavullo nel Frignano (MO), Italia v.vandelli@energieker.it
TECHNICAL ASSISTANCE:	sphera Italia  via Bovini n°41, Ravenna (IT) www.thinkstep.com
COMPARABILITY:	The environmental declarations published within the same product category, but belonging to different programs, may not be comparable. Eg. The EPD for construction materials may not be comparable if not compliant with EN 15804.
RESPONSIBILITY:	Gold Art Ceramica relieves EPDItaly of any non-compliance with environmental legislation self-declared by the manufacturer himself. The holder of the declaration shall be responsible for the supporting information and evidence; EPDItaly declines all responsibility for the manufacturer's information, data and life cycle assessment results.
BACKGROUND DOCUMENTS:	Following declaration has been drafted in accordance with EPDItaly Program Guidelines, available at: www.epditaly.it .
PRODUCT CATEGORY RULES (PCR):	PCR ICMQ-001/15 rev. 2.1 IBU PCR Parte B:30-11-2017 V1.6 La norma EN 15804 costituisce il riferimento quadro per le PCR

COMPANY

Gold art ceramica

Brand “ENERGIEKER”



A dynamic, constantly expanding reality, EnergieKer is a historic leader in the Italian ceramic tile sector. Born in 1986 in Pavullo nel Frignano (Modena), surrounded by the Apennine mountains and close to the core of the Italian ceramic activity, Energieker is now run by the third generation of ceramic entrepreneurs and boasts a production of over 11 million sqm sold all over the world per year.

Quality, innovation and sustainability are the core values of Energieker's investment policy. In the last few years, the company formally completed the in-house production process, granting a careful monitoring among the production chain and securing the utmost quality standards. A state-of-the-art atomizer, one of the biggest ones in Europe, and a brand new grinding and dough preparation plant allow 5 production lines to run 24/7, including also the rectifying and polishing procedures. In 2018 Energieker launched a new production line embodying contemporary technological innovation, which allowed traditional tile manufacturing processes to be replaced by a compaction system, Continua Plus by Sacmi, designed for the production of tiles up to 1600×3200 mm size and either 6, 12 or 20 mm. In 2022 Energieker strengthened the partnership with Sacmi by replacing an outdated production plant with a new, totally digitalized implant with a 187 meter kiln which automatically regulates gas consumption among the various heating sections in order to rationalize and minimize emissions. To this day, the production line is able to save almost 70% of energy compared to traditional manufacturing processes.

Sustainability and environmental protection represent the premises to every strategic decision in Energieker. In order to drastically cut its environmental impact, our production plant presents a consistent photovoltaic park and a cogeneration system by which energy is automatically produced through a turbine connected to an alternator. The thermic energy emitted by the discharged gases of the turbine within the atomizer is then used to make water evaporate, thus almost eliminating the methane gas consumption. All production plants are equipped for the recycling of the raw waste, the reuse of wastewater coming out of the manufacturing process, a severe CO2 emission control and a thorough choice of ecologically certified raw materials.

MANAGEMENT SYSTEM, ENVIRONMENTAL AND QUALITY BRANDS

I prodotti Gold Art Ceramica sono conformi ai seguenti standard:

Gold Art Ceramica's goods comply with following standards:

-  QB32 Marque QB/ Annexe technique et administrative de la certification QB: Carreaux céramiques pour revêtements de sol
-  /QB32 Marque QB/ Annexe technique et administrative de la certification QB: Carreaux céramiques pour revêtements de sol
-  /DEVL1104875A/ Ministère de l'écologie, du développement durable, des transports et du logement - Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement demeur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils
-  /SAUDI QUALITY MARK/ SASO-ISO 13006 and QMS – CR – 10 – 14 (Saudi Standards, Metrology and Quality Organization, Process of Granting Utilization Permit for a Ceramic Tiles)
-  /CNCA-C21-01/ Implementation rules for porcelain tiles
-  **SISTEMA DI GESTIONE AMBIENTALE CERTIFICATO**
CQY
CERTIQUALITY
UNI EN ISO 14001:2015 Environment management system UNI EN ISO 14001:2015
-  NSF certified, contact food

SCOPE AND TYPOLOGY OF EPD

The “cradle to grave” EPD type takes into consideration each aspect of the life cycle of the product and the following modules:

Modules **A1-A3** include the processes of production and consumption of energy and materials in the considered system (A1), transport to the factory gate (A2), manufacturing processes, consumption of water and auxiliary materials, treatment of process waste, liquid and gaseous emissions. (A3).

The **A4** module includes transport from the production plant to the customer or up to the point of installation/implementation of the product considered.

Module **A5** considers all the phases of tile installation (such as the consumption of adhesives) and the treatment of waste generated by packaging (recycling, incineration, disposal). Material and energy claims are declared in Form D.

Module **B2** concerns tile cleaning.

The supply of water, detergent for cleaning tiles, including wastewater treatment, is considered.

Modules **B3-B4-B5** refer to the repair, replacement and renovation of tiles. If the tiles are installed correctly, no repair, replacement and

restoration is required, so these processes are not taken into consideration in this form.

Modules **B6-B7** consider the use of energy for the operation of the building-integrated technical systems (B6) and the use of operating water for building-related technical systems. The use of energy or operating water is not considered. The cleaning water is declared in module B2.

Module **C1** concerns the process of demolition and deconstruction of tiles from the building. It is not considered relevant from the point of view of environmental impacts.

Module **C2** considers the transport of the demolished tile to a recycling or disposal process.

Module **C3** considers every process (collection, crushing process, etc.) suitable for tile recycling.

Module **C4** includes all landfill disposal processes, including pre-treatment and disposal site management.

Module **D** includes claims arising from all end-of-life flows that leave the boundaries of the product concerned system. The impacts of the incineration processes of packaging in phase A5 and the resulting energy credits (electricity and thermal energy) are declared in module D.

PRODUCTION			INSTALLATION		USE							END-OF-LIFE PHASE				PHASES OUTSIDE THE SYSTEM IN QUESTION
Supply of raw materials	Transport	Manufacture	Delivery to site	Installation	Use	Maintenance	Repair	Replacement	Reconstruction	Energy usage	Water usage	Dismantling Demolition	Transport	Waste management	Disposal	Reuse and recovery potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EPD TYPE:

Declaration relating to an average ceramic tile, belonging to the B.l.a. group, of Gold Art Ceramica made at the Pavullo del Frignano site.

GEOGRAPHICAL VALIDITY:

The services have been calculated with reference to the Pavullo del Frignano site. The reference market is global.

DATABASE USED: GaBi 2020 SP40

SOFTWARE:

EPD Process Creator, implemented through GaBi professional 9.2 and GaBi Envision 3.0 software. The identification code of the EPD process tool used is: **EPD Process Tool – V5 of 18/07/2020 –DB version 2020-SP40.**

EPD ISSUED WITH VALIDATED CALCULATION ALGORITHM :

In 2021 Gold Art Ceramica implemented and certified a process for the preparation of EPDs on the basis of data processed by a calculation algorithm validated and certified by ICMQ S.p.A., in accordance with the requirements of EPDIItaly. The process is based on a collection of data at the plant, subsequently integrated, verified and validated in accordance with internal procedures. This EPD has been drafted using the results generated automatically by the tool, for the selected product or products, in order to assess the environmental impacts in relation to their specific use.

DETAIL DESCRIPTION OF THE PRODUCT

Gold Art ceramica ceramic tiles are produced starting from natural raw materials such as clay, feldspar and sand, mixed and atomized internally at the production site. The material category produced is part of B.I.a. porcelain stoneware with water absorption less than 0.5%.

DESCRIPTION OF THE PRODUCTION PROCESS :

In 2017 the production of atomized products began, inside the production plant. Previously the atomized was produced in another production site no longer in possession today.

Entry, storage and entry elaboration of raw materials :

The incoming raw materials are stored in heaps inside covered sheds.
The dosing of the components for the introduction into the production cycle is carried out by means of automatically controlled weighing systems, which implement previously programmed recipes

Grinding of raw materials:

The raw materials are finely chopped with a wet grinding process in mills, with the use of appropriate grinding bodies. The suspension obtained at the end of the grinding (called "barbottina") is stored in reinforced concrete tanks and continuously moved by agitators.

Atomization:

This phase consists in spray drying in hot air streams (about 600 °C) of the slip to obtain the semi-finished "impasto" (powders), having dimensional characteristics and water contents suitable for the subsequent pressing or forming phase of the tiles. The residual moisture of the atomized dough normally obtained is between 6% and 7%. The atomized product is transported within the plant by a hopper system and stored in silos.

Pressing and Drying:

Pressing is the stage of the production process that provides the atomized powder with sufficient mechanical consistency for its subsequent handling, creating the raw tile. The forming of the tiles is carried out in two different ways: through hydraulic presses, fed with the atomized semi-finished product, on which molds suitable for the format to be obtained are installed, or by the "Continua" compaction system for the forming of large formats. The drying process of the pressed ceramic support that brings the residual moisture to levels not exceeding 0.1%. Drying is obtained through systems that use hot air currents at temperatures around 180 °C.

Preparation of glaze and glazing:

The glazes and decorations are applied to the dried ceramic support before the firing phase. The enamels are "conveyed" by preparing them in aqueous suspensions and applying them along the glazing lines; The need to apply different types of digitally printed enamels and decorations involves the installation of long transport lines, on which the semi-finished application stations are activated.

Firing:

It is the thermal process that allows to obtain the greification of the ceramic product. In a thermal cycle lasting about 50 minutes, the tiles are brought to a temperature of about 1220 °C and then cooled.

Squaring, selection and packaging:

Before being sent to the final choice, the fired tiles can be subjected to accessory processes such as cutting, squaring, polishing.

The final phase of the process consists of the quality check of the tiles: each individual tile is checked according to pre-established criteria, in terms of size and quality; Depending on the results of the checks carried out, the tiles are divided into different quality categories, before being properly boxed.

This phase also includes the final packaging and identification of the finished product. Tiles are packed in cardboard boxes, from plastic strapping, placed on wooden pallets and sealed with plastic bags. The amount of packaging material may vary depending on the size of the tiles. The cardboard and plastic used for the packaging of the final product contain recycled material.

Shipping warehouse:

The boxed and palletized goods are digitally inserted in the warehouse software and transported, using forklifts, to the finished products warehouse, where they remained stored until shipment.

TECHNICAL DATASHEET:

Ceramic tiles included in the B.I.a section produced at the Pavullo nel Frignano site are compliant with following technical specifications:

CLASSIFICAZIONE Classification/Classification/Klassifizierung	UNI EN 14411 / ISO 13006	App. G B I a / Annex G B I a	
ASSORBIMENTO D'ACQUA Water absorption/Absorption d'eau/Wasseraufnahme	EN ISO 10545/3	≤0,5%	Valore massimo singolo 0,6%
MODULO DI ROTTURA Modul of ropture/ Module de rupture/ Bruchlast	EN ISO 10545/4	≥35 N/mm ²	Valore singolo minimo 32
SFORZO DI ROTTURA Breaking strength/Résistance à la rupture/ Bruchkraft		≥1300 N Sp, Th, Ep, Dk ≥7,5mm. ≥700 N Sp, Th, Ep, Dk <7,5mm	
DETERMINAZIONE DELLA RESISTENZA ALL'URTO Determination of impact resistance/Résistance aux chocs/Schlagfestigkeit	EN ISO 10545/5	0,87	
RESISTENZA ALL'ABRASIONE PROFONDA Abrasion resistance/Résistance à l'abrasion/Widerstand Tiefenverschleiss	EN ISO 10545/6	<175 mm ³	
RESISTENZA ALL'ABRASIONE SUPERFICIALE Abrasion resistance/Résistance à l'abrasion/Widerstand Tiefenverschleiss	EN ISO 10545/7	I - V	

COEFFICIENTE DI DILATAZIONE TERMICA LINEARE Thermal expansion coefficient/Coefficient de dilatation thermique/Ausdehnungskoeffizient	EN ISO 10545/8	$7 \times 10^{-6}/^{\circ}\text{C}$
RESISTENZA ALLO SCIVOLAMENTO Slip resistance/Résistance à la glissance/Trittsicherheit Gewerbebereich /Trittsicherheit Barfussbereich	DIN 51130	R9-R10-R11
	C.o.F.B.C.R./D.M. 236 14/6/89/	$\mu > 0,40$
	ANSI DCOF A137.1-2012	$> 0,42$
RESISTENZA AGLI SBALZI TERMICI Thermal shock resistance/Résistance au choc thermique/Temperaturwechselbeständigkeit	EN ISO 10545/9	RESISTENTI Resistant Résistant Bestaendig
DETERMINAZIONE DELLA DILATAZIONE DOVUTA ALL'UMIDITA' Determination of moisture expansion/Dilatation due à l'humidité/Dilatation Feuchtigkeit	EN ISO 10545/10	0,0 mm/m
DETERMINAZIONE DELLA RESISTENZA AL CAVILLO Determination of crazing resistance/Resistance au fissuration/Widerstand gegen den Durfen	EN ISO 10545/11	RESISTENTI Resistant Résistant Bestaendig
RESISTENZA AL GELO Frost resistance/Résistance au gel/Frostsicherheit	EN ISO 10545/12	RESISTENTI Resistant Résistant Bestaendig
RESISTENZA AGLI AGENTI CHIMICI: Resistance to chemicals/Résistance aux acides et aux bases/Säure- und Laugenbeständigkeit	EN ISO 10545/13	Min class B
RESISTENZA ALLE MACCHIE Resistance to staining/Résistance au tachage/ Fleckenbeständigkeit	EN ISO 10545/14	Min class 3

BASE/ AUXILIARY RAW MATERIALS:

The two different ceramic bodies are produced using the same raw materials and they differ only in terms of formulation. Moreover, paintings may be added to the dry mixture for certain goods.

Technical-eco Body:

- Clay 30%
- Sand 32%
- Feldspalt 24%
- Raw and baked waste 14%

Technical Body:

- Clay 43%
- Sand 19%
- Feldspalt 30%
- Raw and baked waste 12%

Main components for the glaze:

- Clay powder
- Quartz
- Alumina
- Natural pigments
- Glaze

Main auxiliary additives:

- Dispersing agent
- Binding agent
- Fluidification agents
- Pigments
- etc.

The ceramic tiles made are mainly produced with techno mixture, the eco mixture instead is used only for some particular formats.

INSTALLATION:

The tiles are fixed to the surfaces of walls and floors using specific materials and in different quantities (for example: dispersion adhesives, cementitious adhesives and mortar, sealants or applied liquid membranes). The installation of ceramic tiles does not cause health or environmental risks and no emissions are generated during this phase.

FUNCTIONAL UNIT AND REFERENCE FLOWS:

The functional unit is 1 m² of ceramic tiles for wall and floor cladding, for a period of 1 year. The average mass of the area is 21,04 kg.

REFERENCE USEFUL LIFE (RSL):

The service life of tiles is typically more than 50 years (BNB 2011). In addition, according to the US Green Building Council, the useful life of the tiles could have the same lifespan as the useful life of the building itself. Therefore, 60 years represents an alternative for tiles.

RELEVANT EFFECTS DURING USE:

Fire: In accordance with /EN 13501-1:2007+A1:2009/, ceramic tiles can be classified as class A1 of fire resistance, as they are not flammable.

It has been shown that the coating of ceramic tiles, in case of fire, reduces the heat input on them and therefore the risk of collapse.

Water: Ceramic tiles are insoluble materials and do not react with water.

END OF LIFE AND MECHANICAL DESTRUCTION:

Ceramic tiles can be mechanically crushed but no significant impact on the environment is expected.

REUSE PHASE:

After demolition and deconstruction, ceramic tiles can be crushed and used in a wide range of different applications, such as concrete aggregates or road construction.

DISPOSAL:

According to the European Waste Catalogue (ERC), ceramic tiles fall under group 17 "Waste from construction and demolition operations", tiles and ceramics (code: 17 01 03) and are classified as non-hazardous waste.

LCA RESULTS

The following tables illustrate the results of the LCA (Life Cycle Assessment) study. Basic information on all declared modules is given in chapter 3. Results referring to kg can be converted using the following conversion factor: 0.0443.

RISULTATI LCA - IMPATTO AMBIENTALE per 1 m ² di piastrelle medie di ceramica (21,04 kg /m ²) LCA RESULTS – ENVIRONMENTAL FOOTPRINT of 1 sqm ceramic tiles (21,04 kg / m ²)																
Parameter	Unit	A1 -3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO ₂ -eq.]	9.3	0.499	2.45	0	0.0383	0	0	0	0	0	0	0.0471	0.0453	0.105	-0.224
ODP	[kg CFC11-eq.]	6.11E-011	1.07E-016	5.81E-012	0	7.63E-012	0	0	0	0	0	0	9.96E-018	1.51E-016	5.77E-016	-3E-013
AP	[kg SO ₂ -eq.]	0.0121	0.00472	0.00269	0	5.57E-005	0	0	0	0	0	0	0.000203	0.000318	0.000673	-0.00048
EP	[kg PO ₄ ³⁻ -eq.]	0.00163	0.000533	0.000613	0	4.4E-005	0	0	0	0	0	0	5.03E-005	7.66E-005	7.58E-005	-8.3E-005
POCP	[kg ethene-eq.]	0.00123	0.000241	0.000208	0	6.35E-006	0	0	0	0	0	0	-8.09E-005	3.51E-005	5.06E-005	-5.38E-005
ADPE	[kg Sb-eq.]	6.81E-005	3.67E-008	8.36E-006	0	1.27E-008	0	0	0	0	0	0	5.04E-009	5.16E-008	4.05E-008	-6.43E-008
ADPF	[MJ]	155	6.58	17.7	0	0.332	0	0	0	0	0	0	0.826	0.882	1.49	-3.93
Legenda	GWP = potenziale di riscaldamento globale; ODP = potenziale di esaurimento dello strato di ozono nella stratosfera; AP = potenziale di acidificazione del terreno e delle acque; EP = potenziale di eutrofizzazione; POCP = potenziale di formazione di ossidanti fotochimici dell'ozono troposferico; ADPE = potenziale di esaurimento delle risorse abiotiche non fossili; ADPF = potenziale di esaurimento delle risorse abiotiche fossili															
Caption	GWP = global warming potential; ODP = depletion potential of the ozone layer in the stratosphere; AP = acidification potential of soil and water; EP = eutrophication potential; POCP = potential for formation of photochemical tropospheric ozone oxidants; ADPE = potential for depletion of non-fossil abiotic resources; ADPF = potential for depletion of fossil abiotic resources															

RISULTATI LCA - USO DELLE RISORSE per 1 m² di piastrelle medie di ceramica (21,04 kg / m²)
LCA RESULTS - RESOURCE USE for 1 m² of medium ceramic tiles (21,04 kg / m²)

Parametro	Unità di misura	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	12	0.285	12.7	0	0.0189	0	0	0	0	0	0	0.0465	0.0658	0.201	-1.46
PERM	[MJ]	7.74	0	-8.25	0	0	0	0	0	0	0	0	0	0	0	0
PERT	[MJ]	19.7	0.285	5.42	0	0.0189	0	0	0	0	0	0	0.0465	0.0658	0.201	-1.46
PENRE	[MJ]	156	6.6	19.5	0	0.351	0	0	0	0	0	0	0.828	0.913	1.53	-4.53
PENRM	[MJ]	1.05	0	-1.12	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	[MJ]	157	6.6	18.5	0	0.351	0	0	0	0	0	0	0.828	0.913	1.53	-4.53
SM	[kg]	0.0446	0	0.0029	0	0	0	0	0	0	0	0	0	0	0	17.5
RSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	[m ³]	0.0227	0.000336	0.00567	0	0.000273	0	0	0	0	0	0	5.39E-005	0.000257	0.000386	-0.00111
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as feedstocks; PERM = Use of renewable energy resources as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of fresh water															

RISULTATI LCA – FLUSSI IN OUTPUT E RIFIUTI per 1 m² di piastrelle medie di ceramica (21,04 kg / m²)
LCA RESULTS – OUTPUT FLOWS AND WASTE per 1 m² of medium ceramic tiles (21.04 kg / m²)

Parametro	Unità di misura	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	2.52E-006	2.25E-007	2.63E-007	0	0.00254	0	0	0	0	0	0	3.85E-008	2.39E-008	2.34E-008	-2.13E-008
NHWD	[kg]	0.537	0.000948	1.57	0	0.00631	0	0	0	0	0	0	0.000127	0.000247	7.71	-0.729
RWD	[kg]	0.00103	1.09E-005	0.000293	0	8.01E-006	0	0	0	0	0	0	1.03E-006	1.21E-005	1.74E-005	-0.000239
CRU	[kg]	0	0	0.183	0	0	0	0	0	0	0	0	0	0	0	-
MFR	[kg]	0	0	0.125	0	0	0	0	0	0	0	0	0	18	0	-
MER	[kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
EEE	[MJ]	0	0	0.612	0	0	0	0	0	0	0	0	0	0	0	-
EET	[MJ]	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0	-
Caption	<i>HWD = Hazardous waste disposed of; NHWD = Non-hazardous waste disposed of; RWD = Radioactive waste disposed of; CRU = Components for reuse; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Electricity exported; EET = Exported thermal energy</i>															

TRACI INDICATORS:

In agreement with the US program operator UL.

The TRACI indicators (version 2.1), provided by the EPA Tool for the Reduction and Assessment of Chemical Impacts and Other Environmental Impacts <http://www.epa.gov/nrmrl/std/traci/traci.html>, are listed below:

Indicatori TRACI: 1 m ² di piastrella ceramica (SL = 1 anno)									
TRACI INDICATORS: 1 m ² of ceramic tiles (SL = 1 year)									
Parametro	Unità di misura	A1-3	A4	A5	B2	C2	C3	C4	D
Global Warming Air	[kg CO ₂ -eq.]	9.3	0.499	2.45	0.0383	0.0471	0.0453	0.105	-0.224
Ozone Deplation Air	[kg CFC11-eq.]	6.1E-011	1.07E-016	5.8E-012	8.12E-012	9.95E-018	1.51E-016	5.77E-016	-2.99E-013
Acidificatio Air	[kg SO ₂ -eq.]	0.0135	0.00505	0.00316	8.37E-005	0.000273	0.000428	0.00072	-0.000551
Eutrophication	[kg N -eq.]	0.000819	0.000203	0.000485	8.77E-005	2.1E-005	2.93E-005	3.11E-005	-5.94E-005
Smog Air	[kg O ₃ -eq.]	0.264	0.0958	0.0636	0.00125	0.00599	0.0143	0.0137	-0.0123

CALCULATION RULES

FUNCTIONAL UNIT:

Name	Value	Unit of measurement
declaration unit of measurement	1	m ²
Weight	21,04	kg/m ²
Conversion factor of 1 kg	0,0442	-

ASSUMPTION:

Modules A5 to C4 are scenarios based on average data, included in the PCR created by the "European Federation of Ceramic Tile Manufacturers" /CET PCR 2014/ and subsequently implemented in the PCRb of the IBU program operator "Ceramic tiles and panels v1.6".

EXCLUSION CRITERIA:

All known input and output flows involved in the production process and present within the boundaries of the system were considered.

QUALITÀ DEI DATI / DATA QUANTITY:

The validity period of the background data from the thinkstep database is between 2019 and 2020, chosen this period because it contains the actual production data with the various plant expansions at full capacity. Most of the information (energy and water consumption, pollutant emissions, atomized dust and ceramic production) is measured or calculated directly at company level and declared in the Italian IPPC document called AIA, which is specific and verified for each plant involved in this study. Carbon dioxide emissions (related to carbonate oxidation) are collected through an ETS (Emissions Trading System) declaration.

Detailed data were obtained not only for raw material mixtures (collected with farm-specific primary data) but also for dyes, frits and other raw materials used in the manufacture of enamel. The overall quality of the data can be considered satisfactory.

PERIOD CONSIDERED:

The primary data collected as part of this study is for the production year 2020

ALLOCATION:

Energy and material consumption were allocated to the product in question based on the mass of ceramic tiles made annually. No further allocations were applied in the modules after the production phase. All ceramic waste is recycled internally. Energy recovery credits of packaging materials and product end of life were taken into account.

SCENARIOS

Within the A1-A3 modules, all the necessary processes have been included and described in Chapter 4. The technical information relating to the modules declared beyond A1-A3 and the related scenarios are based on average data, in accordance with the "European Federation of Ceramic Tile Manufacturers" and subsequently implemented by the PCRb of the IBU program operator "Ceramic tiles and panels v1.6".

Transport (A4):

For transports of distances of less than 300km, the return journeys of the vehicles used are considered to be empty load. Return journeys by vehicles, over 300km, are considered full load. This assumption is applied to any type of transport in the analyzed system.

Name	Value	Unit of measurement
Litres of fuel (for functional unit	31	l/100 km
Capacity utilization volume (including idle)	0,85	–
Truck with national destination with a capacity of 27 tons (38.5% of tiles sold)	300	km
Truck with European destination with a capacity of 27 tons (44.7% of tiles sold)	1390	km
Transoceanic transport shipment (16.8% of tiles sold)	6520	km

For the installation phase, 3 options are defined, in which different materials can be used.

- Option 1: adhesives, mortar and water;
- Option 2: mortar and polysulphide dispersion adhesives;
- Option 3: cement adhesives (different quantities for different tile sizes).

These considerations are based on average data provided by several ceramic tile manufacturers in Europe. In this EPD it is assumed that the tiles are installed by means of cement adhesive (option 3).

Option 3 (big-format tiles)	Value	Unit of measurement
Adesivo cementizio Cement adhesive	6	kg

For the treatment of packaging waste, a European average scenario is used, taken from "Eurostat, 2019"; Therefore, the end of life consists of recycling, energy recovery and landfilling for plastic and paper, while reuse, energy recovery and landfilling for wood.
The loss of ceramic material considered is equal to 6.5%.

Use (B1)

The ceramic tiles are robust and have a rigid abrasion-resistant surface. There are no impacts on the environment during the use phase.

Maintenance (B2):

Ceramic cladding products can be cleaned regularly, to a greater or lesser extent depending on the type of building: residential, commercial or sanitary. The consumption of water and detergent was therefore taken into account. The values declared at this stage refer to a period of 1 year for residential use and are described in the table below.

Residential use: 0.2 ml of detergent and 0.1 l of water are used to wash 1 m² of ceramic tiles once a week for floor covering, or once every three months for wall cladding. The scenario of this phase is based on average data provided by several ceramic tile manufacturers in Europe.

Name	Value	Unit of measurement
Water consumption	0,1	l
Cleanser	0,2	ml
Maintenance cycle of floor tiles	48	Numero/SL
Maintenance cycle of wall tiles	4	Numero/SL

Repair, replacement and refurbishment:

In general, the service life of ceramic tiles is identical to the useful life of the building. No additional repair, replacement or refurbishment is required.

Use of energy and operating water (B6, B7):

These modules are not relevant to ceramic tiles

End of Life (C1-C4):

C1: This form is not relevant for ceramic tiles.

C2: Ceramic tile demolition waste is transported from the building premises to a container or treatment plant by truck and is considered an average distance of 20 km. The return trip will be included in the system.

It can be considered an average distance of 30 km from the container or treatment plant to the final destination.

C3-C4: The end-of-life scenario is described in the following table:

Name	Value	Unit of measurement
Percentage of recycled material (C3)	70	%
Percentage of material in landfill (C4)	30	%

Benefits and burdens beyond system boundaries (D):

Module D includes credits from recycling of tile and packaging materials, energy credits from thermal recovery of packaging

ENVIRONMENT AND HEALTH DURING USE

Ceramic is intrinsically inert, chemically stable and therefore, during the use phase, does not emit pollutants or substances dangerous to the environment and health, such as: VOCs and radon.

FURTHER ENVIRONMENTAL IMPACT INFORMATION

MINIMUM ENVIRONMENTAL CRITERIA (MEC):

The tiles produced comply with the Minimum Environmental Criteria (MEC), defined as part of the "Plan for the environmental sustainability of consumption in the public administration sector" and adopted by Decree of the Minister of the Environment for the Protection of Land and Sea (11 October 2017).

4.2 Water consumption and use: the consumption of water in the production phase, from the preparation of raw materials to cooking, for cooked products must not exceed the value of 1 l/kg of product. Waste water produced by production chain processes must have a recycling quotient of at least 90%.

4.3.b Emissions to air (for Particulate and Fluoride parameters): emissions to air for the cooking stage shall not exceed the following values: Particulate matter (dust) 200 mg/m² (EN 13284-1 test method), Fluorides (HF) 200 mg/m² (ISO 15713 test method); cold emissions must not exceed the value: Particulate matter 5 g/m² (EN 13284-1 test method).

4.4 Emissions to water: within the plant, industrial waste water is completely recycled within the production cycle, therefore the criterion is not applicable since no water emissions are generated.

5.2 Waste recovery: at least 85% (by weight) of the total waste generated by the processes must be recovered, in accordance with the general terms and definitions contained in Council Directive 75/442/EEC.

Requirement	Parameter	Declare value	Unit of measurement	Trial method
Water consumption and use	Fres water consumption (Cwp-a) during production	≤ 1	l/kg	-
	Production wastewater recycling quotient	≥ 90	%	-
Emissions to air (declared values are based on test reports and sampling carried out in 2019)	Particulate matter (dust) from cold emissions	≤ 5	g/m ²	EN 13284-1
	Particulate matter (dust) from firing	≤ 200	mg/m ²	EN 13284-1
	Fluorides (HF) for firing	≤ 200	mg/m ²	ISO 15713
Emissions to water	Emissions of suspended solids into water	≤ 40	mg/l	ISO 5667-17
	Cd emissions to water	≤ 0.015	mg/l	ISO 8288
	Cr emissions to water	≤ 0.15	mg/l	ISO 11083
	Pb emissions to water	≤ 0.15	mg/l	ISO 8288
Waste recovery	Total waste generated by the process ¹	≥ 85	% (inpeso) %(in weight)	-

Note 1): assessed in accordance with the general terms and definitions contained in Council Directive 75/442/EEC. Process waste does not include maintenance waste, bio-waste and municipal waste from ancillary and administrative activities

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Parte B: Requisiti della EPD per piastrelle e pannelli di ceramica